

SESSION FOUR

Climate Change and Natural Hazard Risk Assessment and Disclosures



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Hazard Risk Assessment and
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Issuer Capacity to Assess Climate Risk



CA Govts have a mandate, talent, and capital budgets / financial plans



There are tools and data with forecasts from global climate models



Climate risk info can be localized (downscaled) to visualize risk over time



Historical studies have made forecasts of material loss and damage possible



Issuers can adapt capital budgets / financial plans to disclose climate risk

California law (SB 379) Mandated Assessments of Vulnerability

- Required all cities and counties to
 - Address climate adaptation and resiliency strategies
 - Applicable to the city or county
 - In the 'safety elements' of their general plans or FEMA-mandated local hazard mitigation plans

Learn more at ResilientCA.org

- Key question
 - Is this used in capital budgets / financial plans?

Local Gov't. Approaches to Assessing Climate Risk Vary

- CA publicly available tool: CalAdapt
 - Helpful access to data from global climate models
 - Needs more work to localize risk to assets
- Some Cities and Counties have localized risk
 - Still challenged to integrate with budget & finance

CalAdapt is a Starting Point for Climate Risk Assessments

cal-adapt

Tools

Data

Help

Blog

Events

About



Explore and analyze climate data from California's Climate Change Assessments

Cal-Adapt provides the public, researchers, government agencies and industry stakeholders with essential data & tools for climate adaptation planning, building resiliency, and fostering community engagement.



Cal-Adapt is evolving!

Learn about the Cal-Adapt enterprise and our mission to support California's climate change initiatives and preview our future plans.

[READ MORE](#)



Looking for climate data for California's Fifth Climate Change Assessment?

Visit the [blog post on accessing next generation climate data](#)

Latest on Cal-Adapt Blog

[Empowering Climate Resilience at the](#)

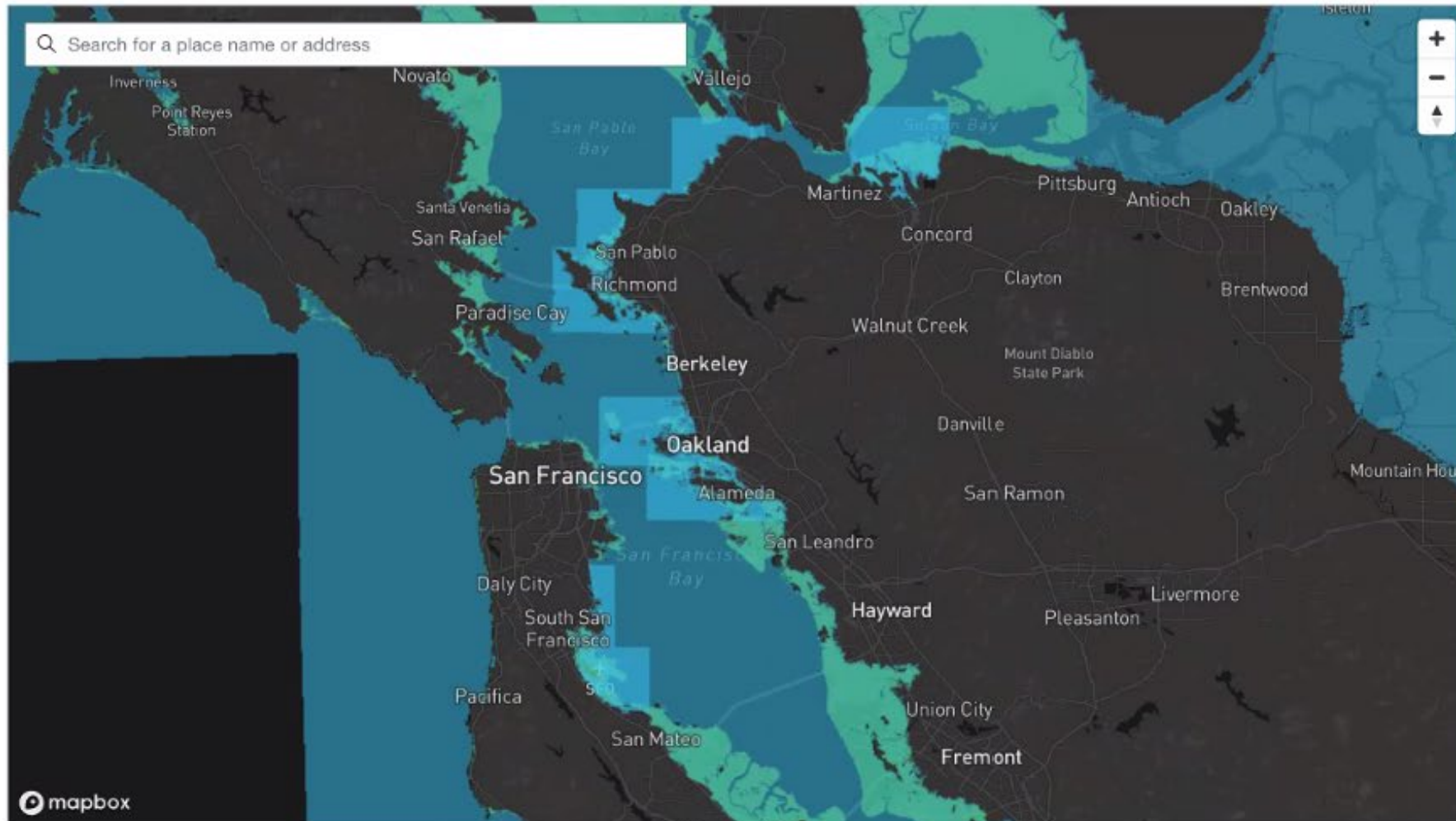
[California Adaptation Framework 2022](#)

CalAdapt is a Toolkit for Accessing Global Climate Models

 Local Climate Change Snapshot A starting point to get climate impacts for your location. EXPLORE	 Annual Averages Projected annual averages of maximum & minimum temperatures and precipitation. EXPLORE	 Sea Level Rise – Coastal Inundation Scenarios Explore the extent of coastal inundation associated with Sea Level Rise and a 100-year storm from two different SLR models. EXPLORE	 Extreme Weather Extreme weather events for baseline and future climates. EXPLORE
 Maps of Projected Change Maps depicting long-term (30 years) changes in annual average temperature and precipitation. EXPLORE	 Extreme Precipitation Events Changes in intensity and frequency of extreme precipitation events. EXPLORE	 Extreme Heat Days & Warm Nights Projected frequency and duration of extreme heat days and warm nights. EXPLORE	 Sea Level Rise – CalFloD-3D Maps of inundation during 100 year storm events with projected Sea Level Rise scenarios. EXPLORE
 Snowpack Timelapse animation and monthly averages of projected Snow Water Equivalent. EXPLORE	 Wildfire Annual and monthly averages of area burned and decadal fire probability for 4 GCMs, and 2 RCPs. EXPLORE	 Cooling Degree Days and Heating Degree Days A common proxy for energy needed to heat and cool buildings. EXPLORE	 Streamflow Charts of VIC routed and bias corrected streamflows driven by LOCA downscaled temperature and precipitation. EXPLORE
			

CalAdapt: Sea Level Rise

Showing available data for **CoSMoS** and **CalFloD3D-TFS (5m)** and **CalFloD3D-TFS (50m)** under a **median** flood scenario for the **2080–2100** period.



SELECT MAP DATA LAYERS

- ☒ CoSMoS
- ☒ CalFloD3D-TFS (5m)
- ☒ CalFloD3D-TFS (50m)

[Learn More](#) ⓘ

SELECT TIME PERIOD

- ☐ 2020–2040
- ☒ 2080–2100

[Learn More](#) ⓘ

SELECT FLOOD SCENARIO

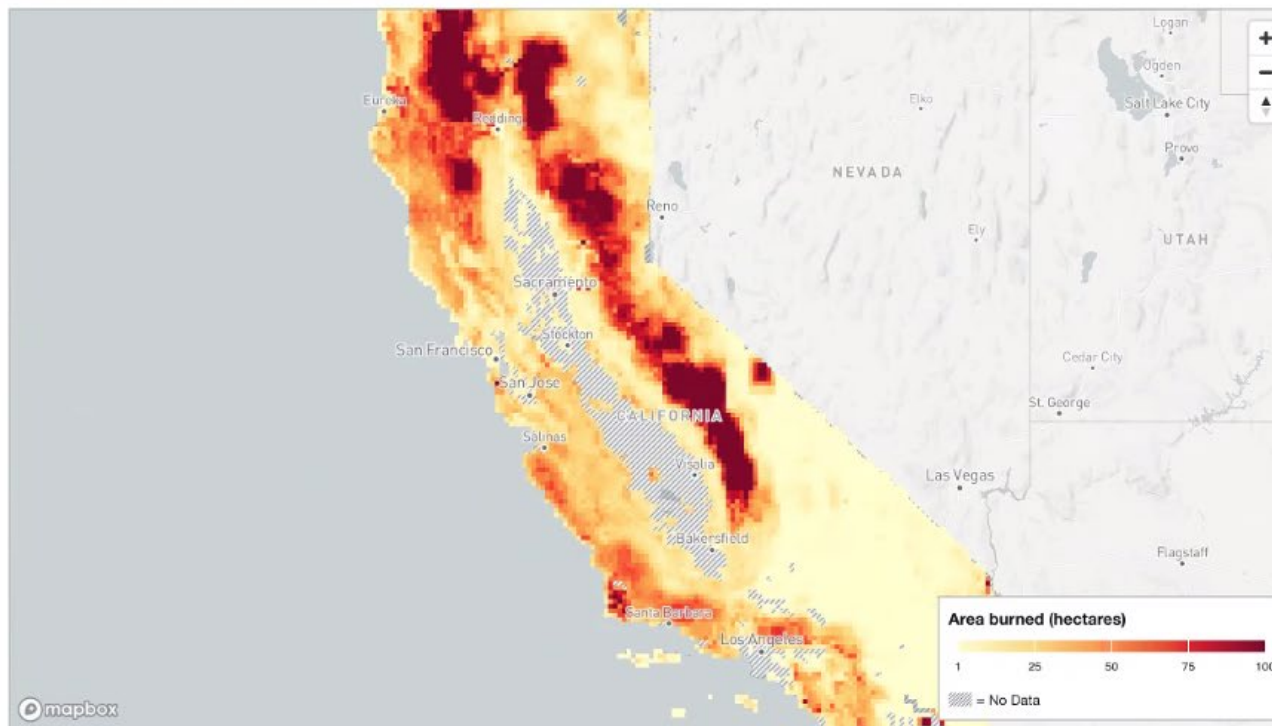
- ☐ minimum
- ☒ median
- ☐ maximum

[Learn More](#) ⓘ

CalAdapt: Wildfire

Decadal Averages Map showing **Modeled Annual Area Burned** over **2090–2099** under a **High Emissions (RCP 8.5) Scenario** and Central Population Growth scenario for **HadGEM2-ES**

! Locations outside the combined state and federal fire protection responsibility areas were excluded from these wildfire simulations and have no wildfire projections.. These areas are shaded in gray.



SELECT TIME RANGE



☒ Decadal wildfire probability

[Learn More](#) ⓘ

SELECT SCENARIO

☐ Medium (RCP 4.5)

☒ High (RCP 8.5)

[Learn More](#) ⓘ

SELECT SIMULATION

☒ Annually

☐ Monthly

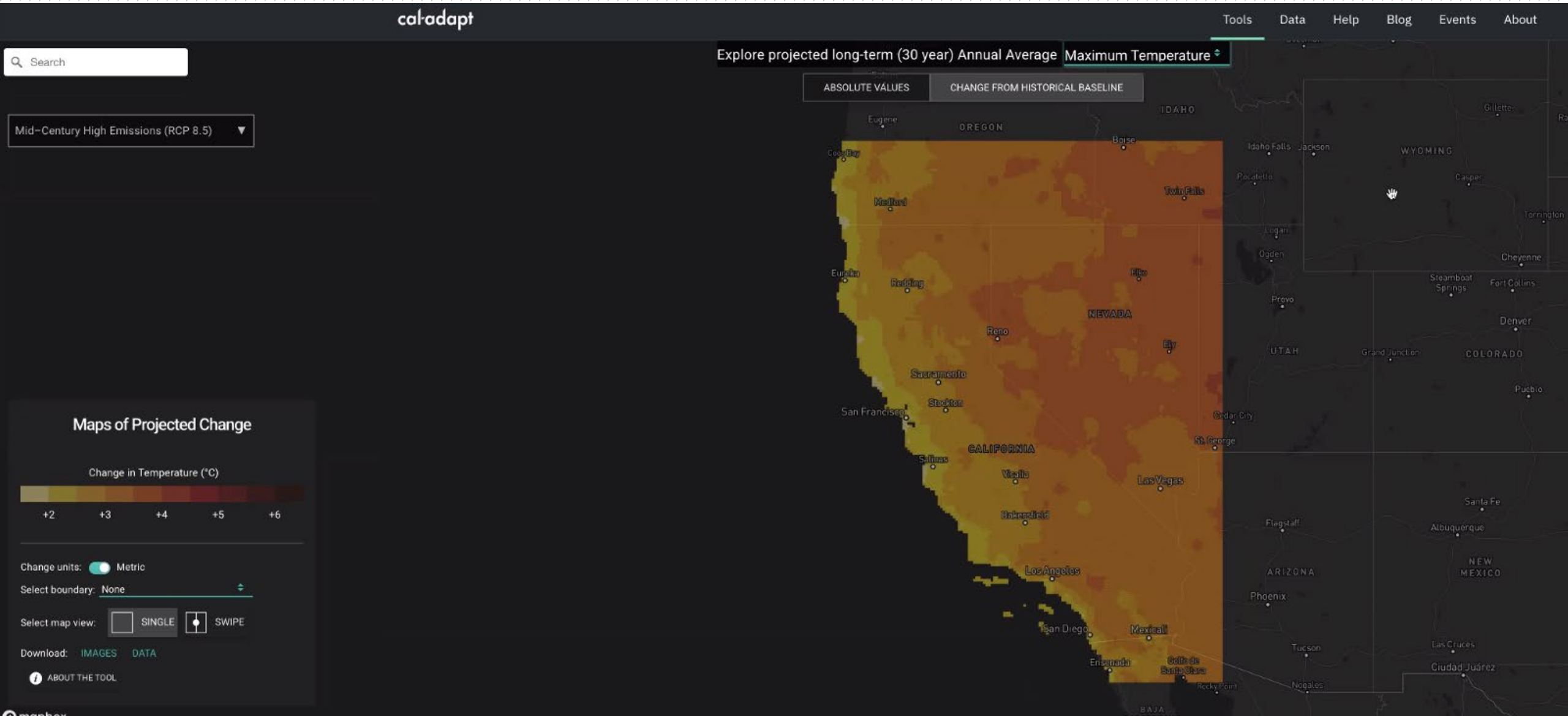
[Learn More](#) ⓘ

SELECT MODEL

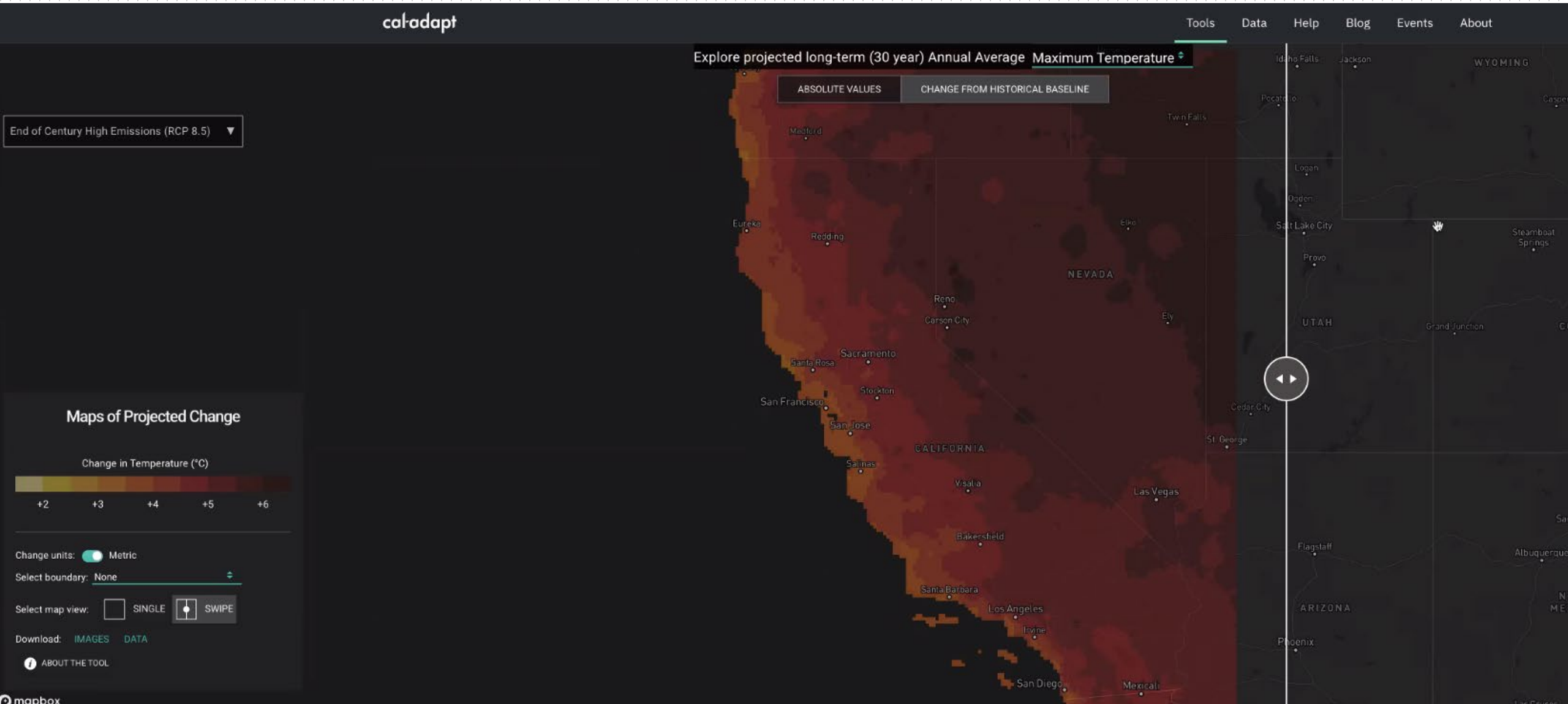
HadGEM2-ES (Warm/Dry) ▼

[Learn More](#) ⓘ

CalAdapt: Max Temperature Rise (Mid-Century)



CalAdapt: Max Temperature Rise (End of Century)



CalAdapt: Extreme Precipitation as Stream Flow

American River at Fair Oaks, California

[Change Location](#)

Projected changes in **Annual Total Unimpaired Flows** by water year for **March, April and May** under a **High Emissions (RCP 8.5) Scenario**.

MODELED HISTORICAL

Baseline (1961-1990)

[Change Period](#)

30 YEAR AVG

22,985 cfs

30 YEAR RANGE

3,440–45,886 cfs

[Learn More](#)

FUTURE PROJECTIONS

Mid-Century (2035-2064)

[Change Period](#)

30 YEAR AVG

22,591 cfs

30 YEAR RANGE

4,134–72,956 cfs

[Learn More](#)

FUTURE PROJECTIONS

End-Century (2070-2099)

[Change Period](#)

30 YEAR AVG

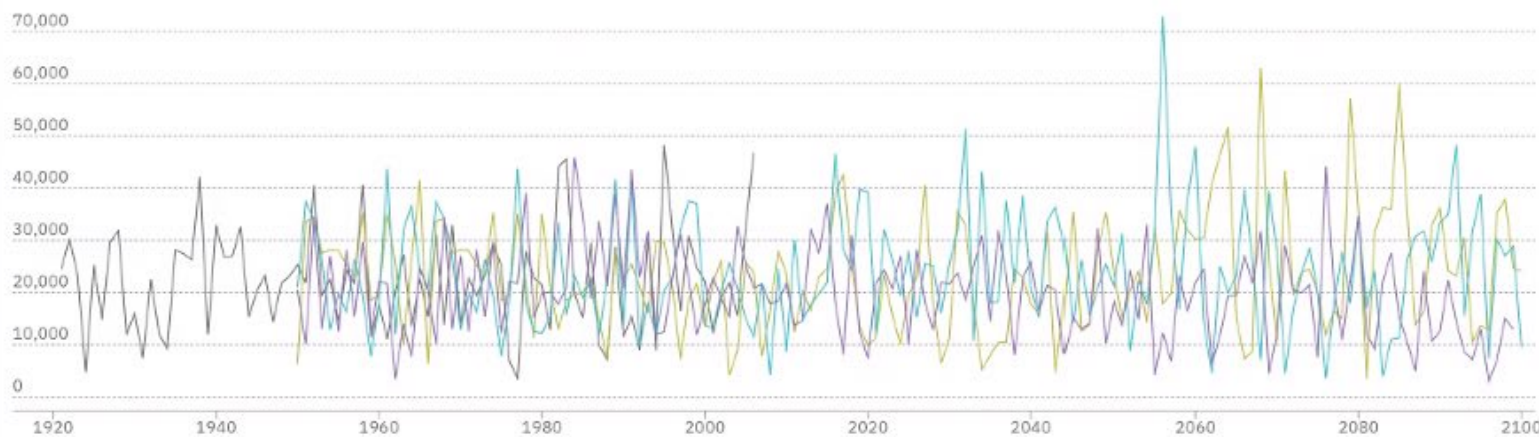
22,109 cfs

30 YEAR RANGE

2,948–60,043 cfs

[Learn More](#)

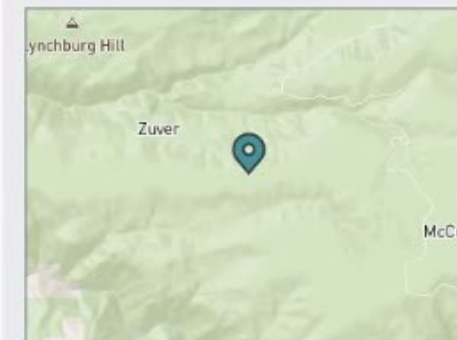
80,000 Annual Total Unimpaired Flows (cfs)



■ Observed ■ CanESM2 (Average) ■ CNRM-CM5 (Cool/Wet) ■ MIROC5 (Complement)

Source: Cal-Adapt. Data: Routed Streamflow Projections (Scripps Institution of Oceanography), Unimpaired Historical Streamflows (California Department of Water Resources).

SELECT STATION



[Learn More](#)

SELECT INDICATOR

- ☒ Annual
- ☐ Monthly

[Learn More](#)

SELECT MONTH

3 x Select months ^

- ☒ March
- ☒ April
- ☒ May
- ☐ January
- ☐ February
- ☐ June

3 x Select... v

CanESM2, MIROC5, CNRM-CM5

[Learn More](#)

Climate Risks Need to be Localized and Monetized

- Localize
 - CalAdapt
 - Wildfire
 - Sea Level Rise (but will need tides + precipitation)
 - Get to parcel level projections, 2100
 - Urban Heat Island Effect (Temperature)
 - Flooding (Precipitation)
- Monetize
 - Is this used in capital budgets / financial plans?

Example of Localized Climate Risk: City of San Luis Obispo



CITY OF
SAN LUIS OBISPO

LIVING

VISITING

GOVERNMENT

SERVICES

BUSINESS

I WANT TO...

Q

- COMMUNITY DEVELOPMENT

+ Key Information & Reporting

+ Cannabis

- Planning & Zoning

+ Zoning

Zoning Map

Specific & Area Plans

Planning Permits

Tiny Home on Wheels

- General Plan

Housing Element

Noise Element

Safety Element

Conservation and Open Space Element



Government » Department Directory » Community Development » Planning & Zoning » General Plan »

CLIMATE ADAPTATION AND SAFETY
ELEMENT

Font Size:

+ -

+ Share & Bookmark

Feedback

Print

The Safety Element of the General Plan was last updated on January 17, 2023, in accordance with state law (Senate Bill 379 Government Code Section 65302) that requires integration of comprehensive climate adaptation and resilience strategies, the City applied and received a Sustainable Communities Grant from the California Department of Transportation.

Under state law, a safety element promotes protection for the community from unreasonable risks related to slope instability, seismic activity, subsidence, liquefaction, known geologic hazards, flooding, wildland and urban fires, tsunamis, seiche,

FAQ Box

Will a traffic impact study be required and if so what is the process?

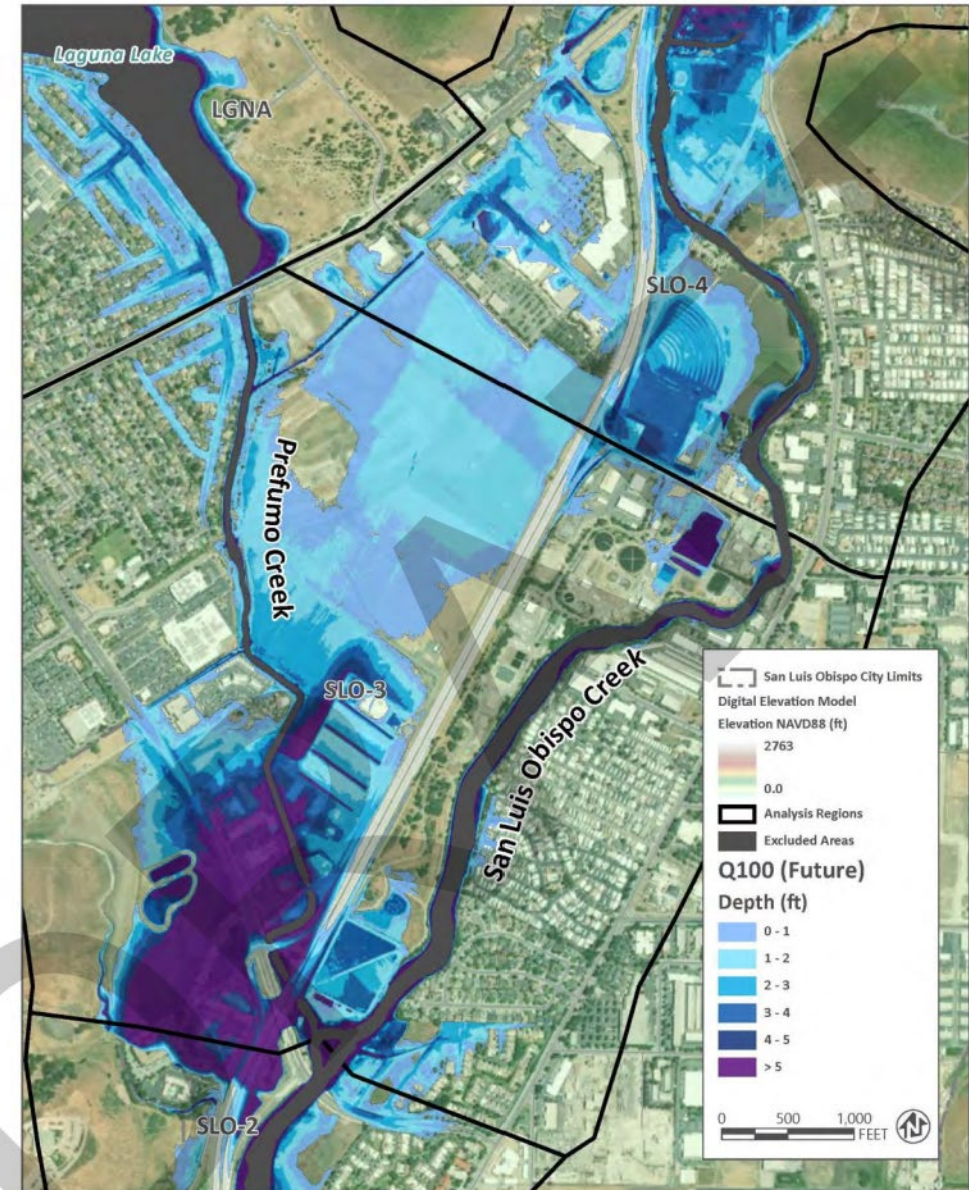
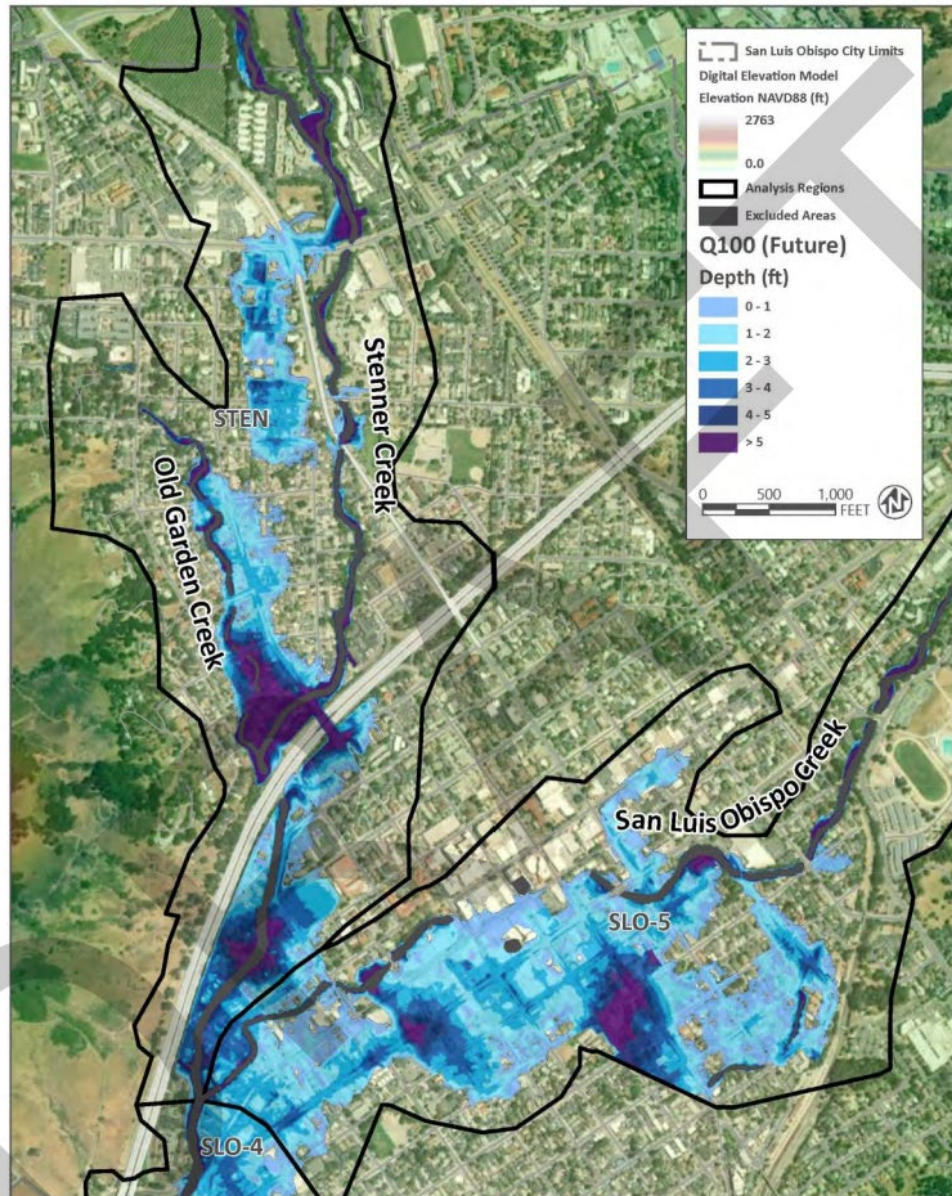
How do I apply for a permit?

What type of approval

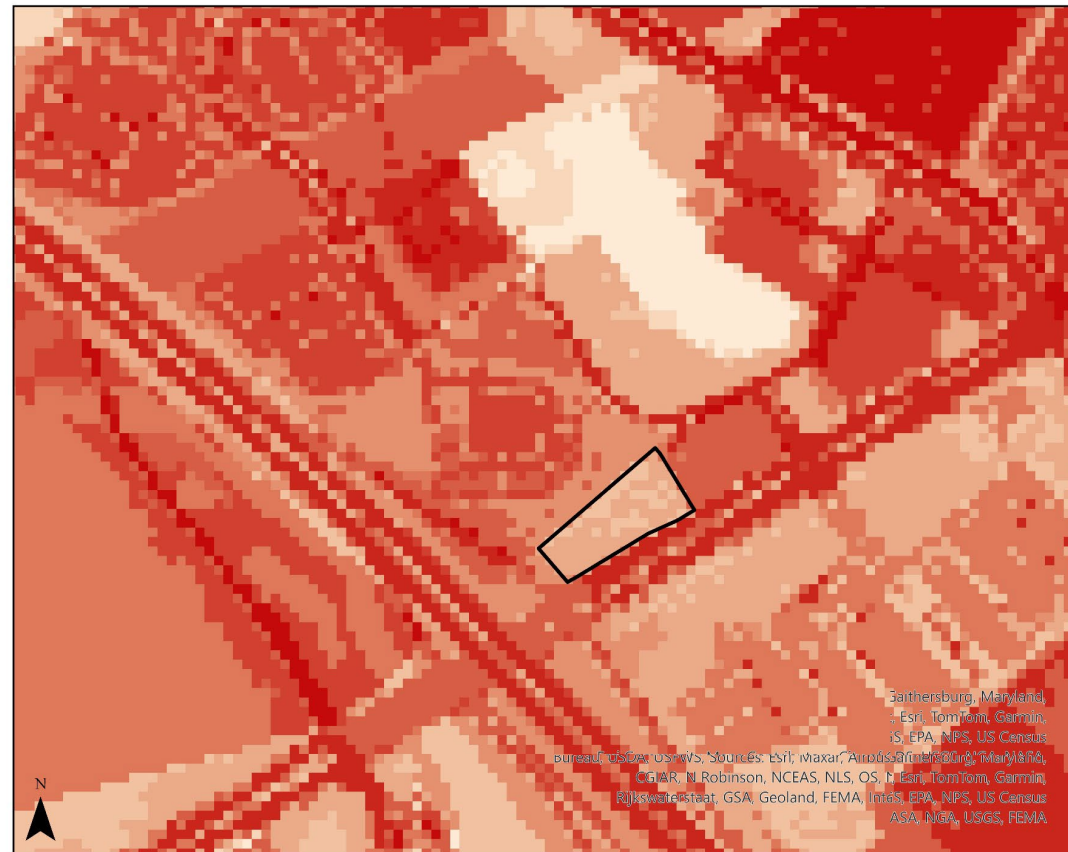
CLASSIFICATION
Classification: Schwab

15

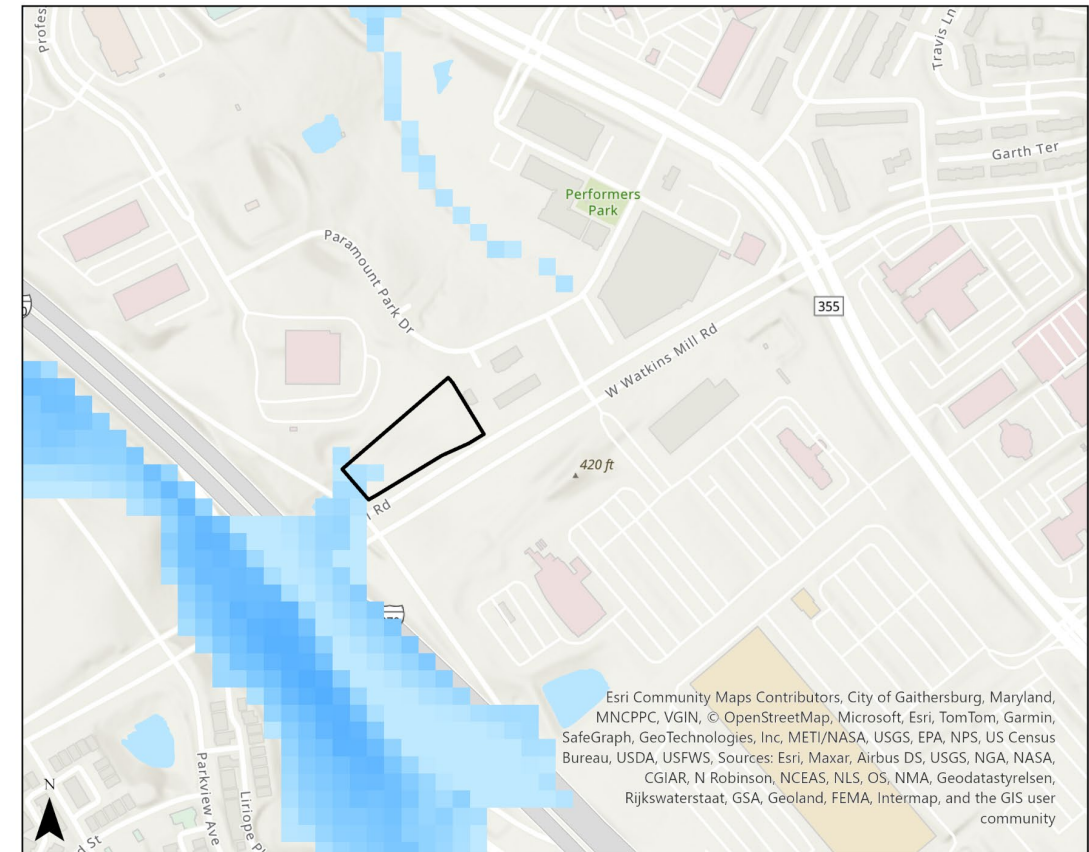
Example of Localized Flood Risk: City of San Luis Obispo



Example of Localization (Climate Solutions Intl.)



PoliceStation_example
PoliceStation_examp
Urban Heat Island +
Climate Change 2100 (C)
13.3327
7.33272



PoliceStation_example
PoliceStation_examp
Moco GFA 2100 500yr
24hr depth
125.5
0

Why Disclose?

- Don't let fear of public reaction prevent disclosure
 - Data is already out there! (Riskfactor.com)
 - It's designed for residential (30-year forecast)
 - It's not the right data for Cities/Counties
- Cities and Counties need to show they know
 - With better data for their purposes
 - Incorporated into their planning and budgeting process

Example from Riskfactor.com for Residential Risk

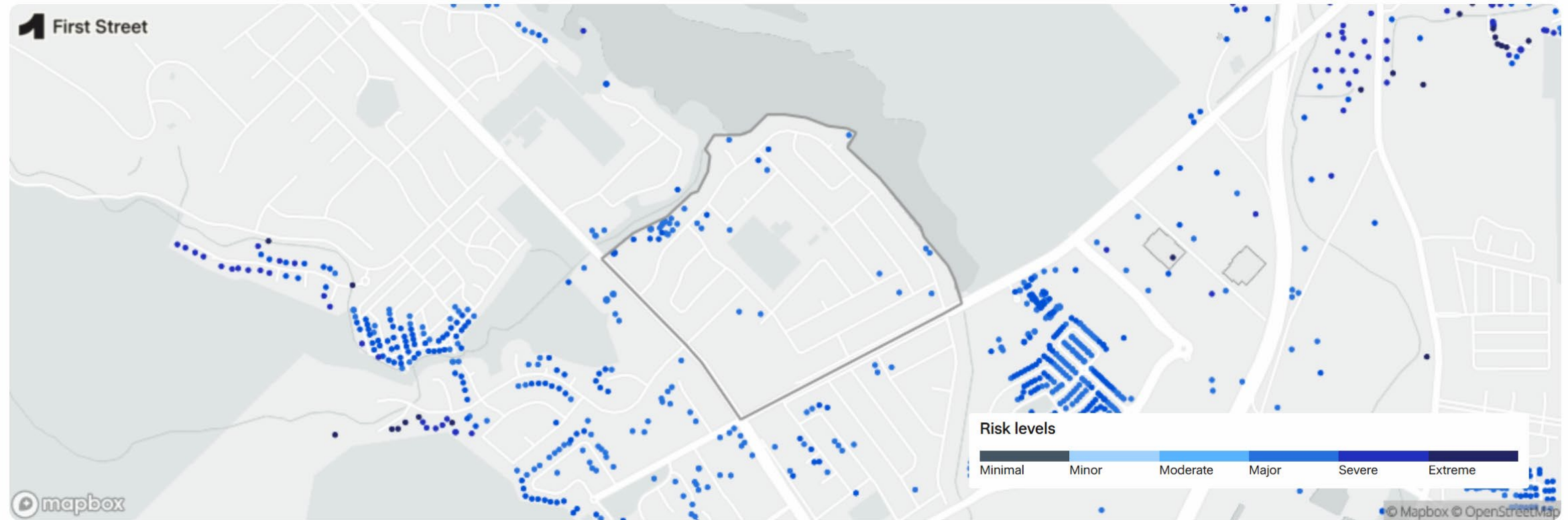
Flood Factor

Fire Factor

Air Factor

Heat Factor

Madonna Flood Map



Community Impact from Flooding in Madonna

Find the Flood Risk for Any Property

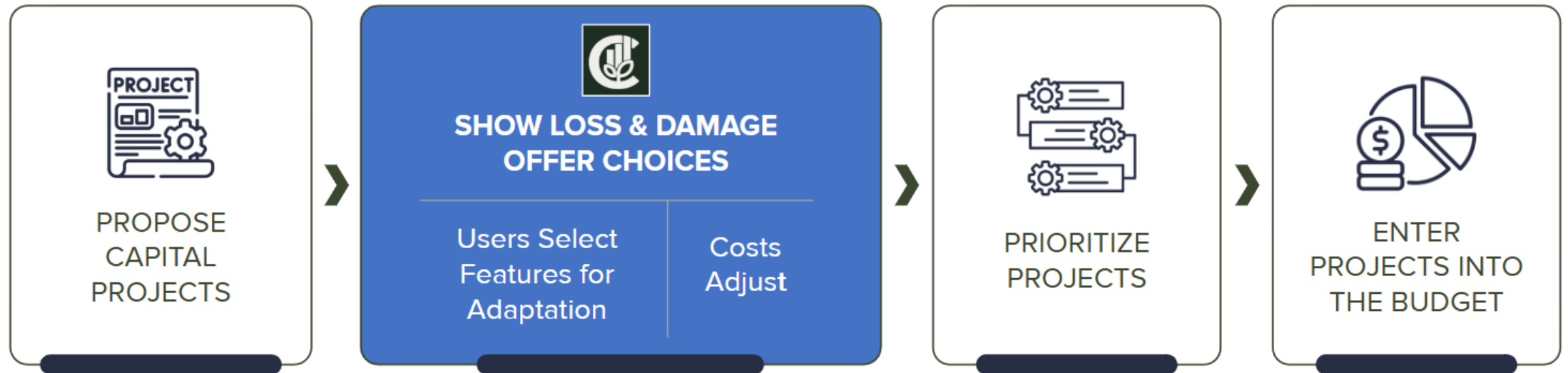
In addition to property damage, flooding can cut off access to utilities, emergency services, transportation,

About Monetizing Climate Risk

- The Cost of Doing Nothing (it's a Forecast)
 - A business-as-usual baseline
 - It is a forecast of loss and damage
 - Adaptation brings forecasts of avoided loss and damage
- The Key is to Integrate these Measures
 - in Capital Plans and Budgets
 - In Financial plans

Example: Capital Budgets

- Climate Solutions International's Approach
 - Integrate with existing capital budgeting process



climatesolutionsintl.com

Example of Monetization: Climate Solutions Intl. Software

REVIEW SITE CLIMATE HAZARDS

WE'VE IDENTIFIED THE FOLLOWING POSSIBLE CLIMATE RISKS TO YOUR CURRENT SELECTED SITE. CHOOSE WHETHER TO CONTINUE WITH THIS SITE AND EXPLORE MITIGATION OPTIONS, OR CHANGE THE LOCATION FOR THIS SUBPROJECT.

FLOOD

URBAN HEAT

WIND

0 ft 1 ft 2 ft 3 ft 4 ft 5 ft+

CURRENT SITE

SITE NAME

Site Details

Expected Lifespan20 Years

Site Acquisition Costs\$1.5M

Construction Cost\$22.2M

Lifetime Operation Cost\$10M

ACTIVE RISKS

Flooding

Moderate Risk

Risk During Lifetime15%

Flood Depth2 ft

Estimated Potential Losses ⓘ\$5.8M | 21%

Urban Heat

Extreme Risk

Expected Temperature Rise4 °C

Likelihood of 3+ Day Heatwaves22%

Estimated Potential Losses ⓘ\$10.2M | 35%

Wind

Minor Risk

22

Example of Monetization: Climate Solutions Intl. Software



Example of Monetization: Climate Solutions Intl. Software



THANK YOU!

JAN WHITTINGTON

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CEO, Climate Solutions Intl.*



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Important Disclosures

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Benefits of Strong Natural Hazard Risk Disclosure



Reveals good governance if you have a climate risk strategy



Provides investor confidence and trust in management



Allows the Issuer to shape the “story”, not the headlines



May reduce market price volatility after an adverse event



May improve investor demand if debt is issued to finance recovery efforts

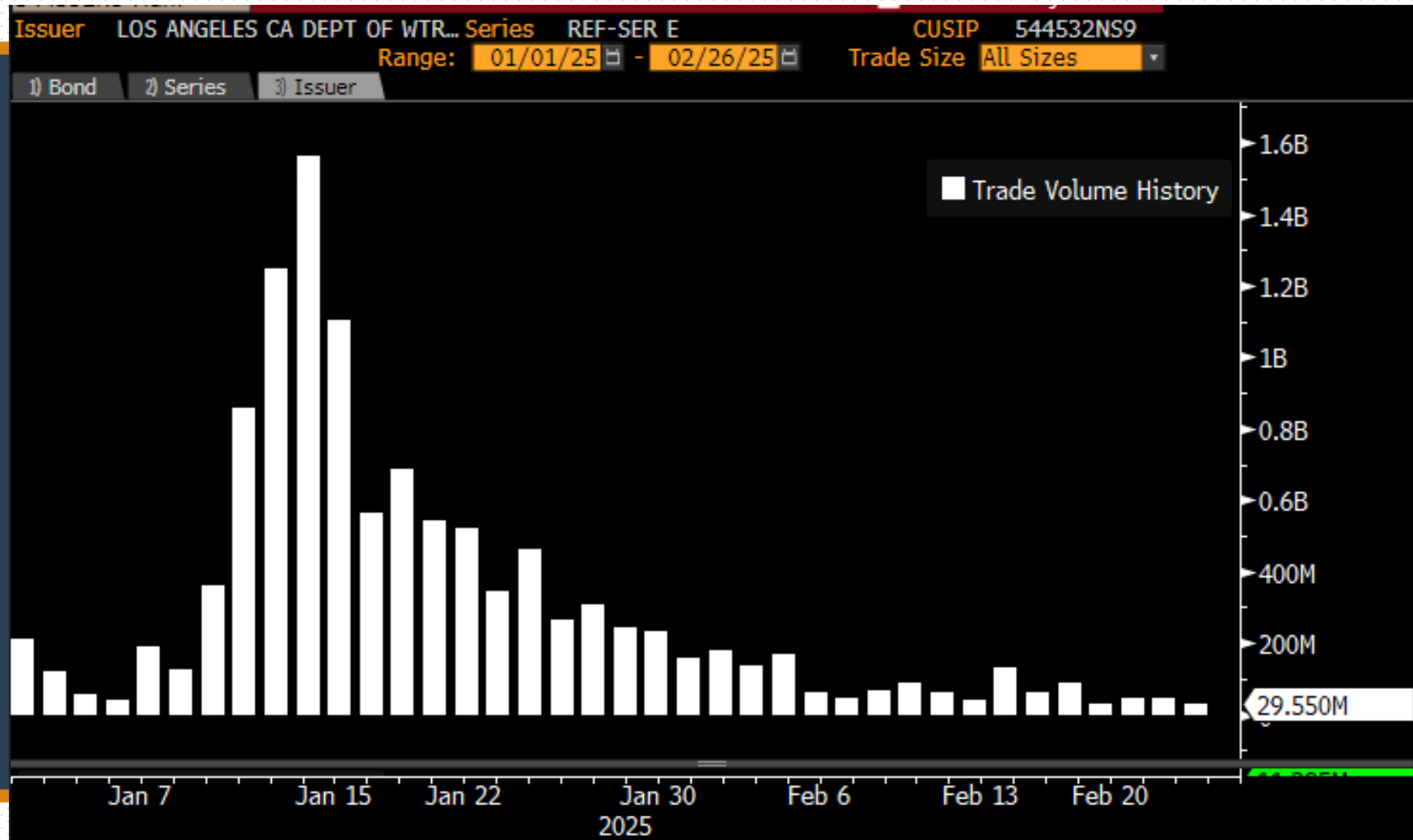
Good Disclosure Includes Discussion of:

- Hazardous risk exposure level of severity
- Risk mitigation strategy and actions taken
- State mandates
- Insurance coverage
- Capital mitigation plans, projected cost, and financing plan

What Does An Investor Look at When a Disaster Hits?

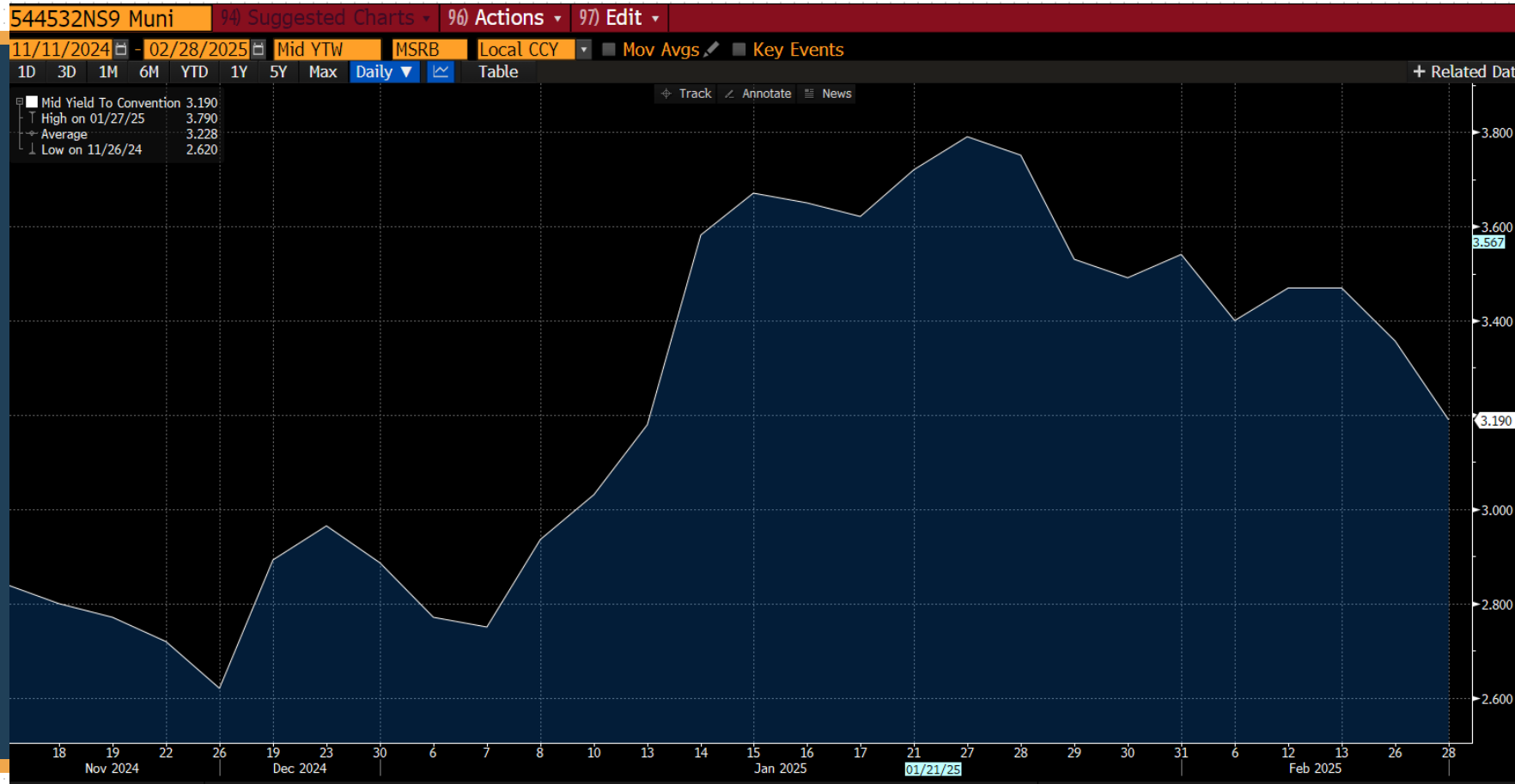
- Size of area impacted relative to service area or tax base
- Disaster response efforts
- Eligibility for state and federal aid
- Impact to revenues and expenses
- Issuer's financial flexibility
 - Liquidity and financial reserves
 - Ability to raise taxes or rates
- Estimate of financial liability
- Market and rating agencies' response

Los Angeles Department of Water & Power, Power System: Impact on Trade Volume from the January 2025 Palisades Fire



Source: Bloomberg

Los Angeles Department of Water & Power, Power Bonds: Impact on Yields from the January 2025 Palisades Fire



CUSIP 544532NS9: Issued at a 2.84% yield in November 2024, 7/1/2034 maturity, \$59.7 million outstanding

What Drove Market Volatility?

- Fast-moving, uncontrollable nature of the wildfires
- Headlines – mass evacuations, images of Los Angeles on fire, loss estimates
- Inverse condemnation concerns combined with lack of information on LADWP liability for the Palisades Fire
- Selling by investors with low risk tolerance
- Rating agency negative rating actions
- Lack of investor outreach

What Calmed the Markets?

- Moody's January 17 report stating LADWP's power equipment did not appear to be the ignition source for the Palisades Fire
- Moody's commentary that LADWP's Water System operated as designed
- Buying by investors with higher risk tolerance
- Containment of the fires, reduced headline news
- LADWP reports of water and power restored to the burned areas, rapid Phase I (hazardous waste) clean up

QUESTIONS?



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